SOCIETIES AND ACADEMIES

LONDON

Royal Society, February 8.—"On the Hindoo Division of the Octave, with some Additions to the Theory of the Higher Orders," by R. H. M. Bosanquet, Fellow of St. John's College, Oxford. Communicated by Prof. Henry J. S. Smith, Savilian Professor of Geometry in the University of Oxford.

Attention has been recently directed to the remarkable division of the octave into 22 intervals, employed by the Hindoos. The paper commences with a slight account of the Hindoo scales as thus derived. It is then remarked that our best way to a real analysis of this music would be to study the system of 22 and compare the results with those actually obtained by Hindoo musicians. The methods, which have been employed in the writer's former paper on the subject,[1] are then extended to the higher orders, which have not been before thoroughly discussed. The system of 22 is a system of the second order, and the nature and peculiarities of such systems, and of the system of 22 in particular, are discussed.

A classification of systems of the higher orders according to their mode of forming thirds is advanced. If the system be arranged in successive series of fifths, differing by one unit in pitch, then the system is said to be of class x, if the third of any note is in the series x units below that which contains the note itself.

The system of 22 is shown to be of the second order and first class.

A system of 34, also of the second order and first class, is pointed out as being of considerable excellence, even from a modern practical point of view.

It is shown that in systems of the second order and first class, modulation through a third cannot be regarded as equivalent to modulation through any number of fifths.

The notation is extended to systems of the rth order.

The subject of the transformations of the generalised key-board is then entered upon. It is remarked, in the first instance, that any form of arrangement whatever can be constructed by rearranging a supply of keys of the ordinary patterns.

The problem of inversion is then solved, and it is shown under what circumstances, by simply inverting the succession from end to end, a key-board can be obtained in which rise corresponds to fall of pitch, and *vice versâ*.

The general transformation of the rth order is then investigated, and a rule is given by which the key-board of the rth order can be arranged with the ordinary keys.

This rule is then applied to the construction of the key-board of the second order, and a diagram is given of a portion of a key-board so arranged. Systems of the second order and first class, such as the systems of 22 and 34 above-mentioned, can be controlled with facility by means of this arrangement.

February 15.—On Crookes's force, by G. Johnstone Stoney, F.R.S., and Richard J. Moss, F.C.S.—This paper is a preliminary report of an experimental investigation of the theory of Crookes's radiometer proposed by Mr. Stoney in the *Philosophical Magazine* for March and April, 1876. The term "Crookes's force" is employed to designate the reaction which comes into play between the blackened disks of a radiometer and the walls of the exhausted chamber when a difference of temperature exists between them. The authors have sought to determine quantitatively the relation of the force to the tension of the residual gas, and the influence of variations in the distance between the reacting surfaces. For this purpose they employ an apparatus in which a blackened disk of pith can be placed at any required distance within twelve centimetres from a delicately suspended disk of thin microscope glass. The pith disk is heated by projecting on it the image of a uniformly illuminated aperture in a metallic screen. The relative magnitudes of the force are estimated by determining the distance to which the glass disk is repelled in a given time. It is sometimes difficult to distinguish between the effects of convection currents and those of Crookes's force. It is certain, however, that when the tension of the residual gas is as much as five millimetres of mercury there is a Crookes's reaction through a space of at least ten millimetres.

At distances of from twenty to eighty millimetres the very feeble force acting on the glass disk seemed to vary about inversely as the tension. It appeared to be nearly independent of the distance when the distance exceeded twenty millimetres.

[1] *Proc. Roy. Soc.*, No. 161, 1875, p. 390, and "An Elementary Treatise on Musical Intervals and Temperament." (Macmillan, 1876.)

At distances of five, ten, and twenty millimetres, the force on the swinging disk made some approach to varying at each tension inversely as the distance. But so far as may be judged from measures of such exceedingly feeble forces, there is a sensible deviation from this law at most of the tensions. Moreover the observations, taken as a whole, seem to suggest, in conformity with the dynamical theory, that the law changes with variations of density.

Linnean Society, February 15.—Prof. Allman, F.R.S., president, in the chair.—Messrs. W. Burns, E. L. Gardner, Prof. W. Harrington (of Michigan, University, U.S.), J. W. S. Meiklejohn, the Rev. J. Stobbs, and Sir Charles W. Strickland, Bart., were elected Fellows.—There was exhibited under the microscope by Mr. Arthur Lister the plasmodium of one of the lowly organised Myxomycetæ. This protoplasmic mass demonstrated the peculiar amœboid movements, and the occasion gave rise to an animated discussion on its contested animal or vegetable nature.—Two botanical papers were read, the first on the rootstock of *Marattia fraxinea*, Sm., by Mr. John Buchanan; the second on the Algæ collected at Rodriguez during the Venus Transit Expedition, 1874, by Prof. Dickie. The Marattia is chiefly found in the northern part of New Zealand. The Maories use it as food, but do not cultivate it systematically. They say that when it is smashed, the pieces thrown on the ground spring up freely and thus it has increased. At Wellington, where transplanted, it grows luxuriantly when placed in rich damp soil. Mr. Buchanan has now studied its mode of growth; he considers the rootstock as resembling a scaly bulb more than a fern rhizome, and likens its propagation to that of the potato, though modified. Its growth is very slow, hence, probably, its scarcity. The fresh-water Algæ of Rodriguez point in an Asiatic direction, none are African species, while some have rather a world-wide distribution.—The Secretary read a note on a new example of the Phyllodocidæ (*Anaitis rosea*), by Dr. W. C. McIntosh. This marine worm was obtained at St. Andrews. It is 1½ inch long, with relatively broadish body, blunt snout, and small eyes. On head and body it is slashed and speckled with pink, which merges into a yellow band behind.—A communication was read on deep-sea anemones (Actinaria) dredged from on board the *Challenger*, with a description of certain Pelagic surface swimming species, by Mr. H. N. Moseley, late naturalist to the above expedition. The occurrence at great depths of representatives of ordinary shallow water forms of Actinia is of profound interest. A species of Edwardsia, from 600 fathoms, has undergone but trifling modification from the littoral form. The *Cerianthus*, from 2,750 fathoms, is dwarfed, but uncommonly like its shore brethren. Thus it appears one kind is found in shallow water at the Philippines under the full glare of the tropical sun, while another species of the same genus exists at three miles depth, where solar rays never penetrate, and the water keeps at freezing point. The fact of the deep-sea-Anemones retaining vivid colouring in their dark watery abode is a point of special value as connected with certain other generalisations. The new genus *Corallimorphus* likewise possesses interest both on account of being a near ally to certain of the simple discoid corals, and of its having the largest stinging cells (nematocysts) yet recorded.—An extract of a letter on the marsupial pouch of the Bandicoot, by Mr. R. D. Fitzgerald, was briefly adverted to by the Secretary.

Chemical Society, March 1.—Prof. Abel, F.R.S., president, in the chair. Prof. E. T. Thorpe delivered his lecture on "The theory of the Bunsen lamp." The speaker, after some preliminary remarks as to the great value of this instrument, both to the scientific chemist and also in the arts, gave a short description of the lamp and proceeded to show the principle on which it acted. The gas issuing from the jet draws in air through the holes in the side, and becomes mixed with it in the tube, the amount of air being about 2 to 2½ times the volume of the gas, and as it burns on an average 80 litres of gas per hour, as much as 250 litres of the mixed gases pass through the tube of the lamp in that space of time. After having sketched the progress of the mixture of gas and air up the tube, attention was directed to the flame itself, which is hollow, and contains a large internal space of the uninflamed gaseous mixture. As it has been found that a mixture of gas with less than 3½ times its volume of air will not burn, it is only, therefore, when it meets with an additional supply of oxygen from the surrounding air that combustion occurs. The composition of the gas in the tube and in various parts of the flame was then studied, and the probable causes of the want of luminosity in the flame stated these are due

to the dilution of the gas by the nitrogen, the oxidation of luminiferous material, and the depression of temperature produced by the diluting gases, such as nitrogen, carbonic oxide, and aqueous vapour.

Meteorological Society, February 21.—Mr. H. S. Eaton, M.A., president, in the chair.—William Adams, Thomas Black, Robert W. Munro, and R. Bowie Wallcott, M.D, were elected Fellows; and Mons. U. J. Leverrier, Director of the Observatoire National, Paris, an honorary member of the society.—The President gave an inaugural address. After referring to the various theories advanced to account for changes of climate, he observed that in drawing deductions from a long series of observations of the temperature of the air, it is important to ascertain whether the conditions of the surrounding district have altered, otherwise changes in reality due to local causes may be erroneously assigned to secular variation. The climate of London has thus been modified by the consumption of fuel and the vast population. He estimated that the heat developed from the present annual consumption of 5,000,000 tons of coal on the metropolitan registration area of 118 square miles, and from all other artificial sources, would suffice to raise the temperature of a stratum of air 100 feet in depth resting on that area 2°·5 every hour. The effect of the growth of the population of London from 900,000 at the commencement of the century to 3,500,000 at the present time, and of the still greater increase in the comparative consumption of coal was manifested by the rise in the average temperature of the air at the Royal Observatory, Greenwich, which place was year by year becoming more surrounded by a network of houses and population. For this reason Greenwich was not a suitable place for a Meteorological Observatory of the first order. Mr. Eaton subsequently referred to some of the practical difficulties experienced in pursuing the study of dynamical meteorology.—The following papers were then read:—Barometrical and thermometrical clocks for registering mean atmospheric pressure and temperature, by William F. Stanley; solar thermo-radiometer; and on an improvement in minimum thermometers for terrestrial radiation, by James J. Hicks.

Anthropological Institute, February 27.—Mr. John Evans, F.R.S., president, in the chair.—Mr. A. H. Keihl, was elected a member.—Mr. M. J. Walhouse read a paper on non-sepulchral rude stone monuments. Adverting to the extravagant Druidical and Dracontian theories formerly connected with megalithic remains, he observed that perhaps at present speculation had gone to another extreme in refusing to see in them any purposes other than sepulchral. In this paper he adduced examples, many from his own observation of cairns, cromlechs, torlithons, stone-circles, and other megaliths, which he considered could not have been connected with burials, and he advocated the non-sepulchral intention of open-sided dolmens such as Kitscoty House, and those at Rollright and Drewsteignton, comparing them with similar structures now used in India as rude temples for sacred stones and images. The paper concluded with some observations on stone-worship, especially as now practised in India. Many existing instances were described, and passages quoted from classic authors, denoting its prevalence in antiquity. Some speculations were also brought forward as to the causes of rough stones having been so frequently taken for objects of worship. Col. A. Lane Fox, Mr. Hyde Clarke, the President, and others, took part in the discussion.

Entomological Society, January 17.—Anniversary Meeting.—Sir Sidney Smith Saunders, C.M.G., vice-president, in the chair.—An abstract of the treasurer's account and the Report of the Council for 1876 were read.—The following were elected members of council, viz., Prof. Westwood, Sir Sidney S. Saunders, and Messrs. H. W. Bates, Champion, Dunning, Grut, Meldola, Stainton, Weir, Douglas, E. Saunders, Rev. A. E. Eaton, and Rev. T. A. Marshall.—The following officers were elected, viz., Prof. Westwood, president, J. Jenner Weir, treasurer, Rev. T. A. Marshall, librarian, and Messrs. F. Grut and R. Meldola, secretaries.—The president, in consequence of an accident, was prevented from attending, and the delivery of his address was unavoidably postponed till the next meeting.

February 7.—Prof. Westwood, president, in the chair.—W. Denison Roebuck, of Leeds, was balloted for and elected a subscriber.—The president nominated Messrs. J. W. Douglas, J. W. Dunning, and H. T. Stainton as vice-presidents for the ensuing year.—The president delivered the address, postponed from the last meeting, on the progress of entomology during the past year.—Mr. F. Bond exhibited a specimen of the North American butterfly, *Danais Archippus*, taken in September last near Hassock's Gate, Sussex, being the third specimen taken in this country.—The president exhibited a specimen of the singular butterfly *Bhutanitis Lidderdalii*, Atkinson, from Bhotan. He also read a letter which he had received from Baron v. Osten Sacken referring to his paper on the Dipterous genus *Systropus*, published in the last part of the *Transactions* of the Society, in which he had stated that a species in Natal (*S. crudelis*) had been bred from a cocoon resembling that of *Limacodes*, and pointing out that *Systropus macer*, the common species in the United States, had been bred from the cocoon of *Limacodes hyalinus*, and was a remarkable instance of community of habit among insects of the same genus in far-distant regions.—The president read some remarks he had received from M. Ernest Olivier, of Moulins, respecting insects of the Dipterous genus *Bombylius*, frequenting the nests of a bee of the genus *Anthophora*, at Pompeii.—Mr. McLachlan exhibited a case of a Lepidopterous larva sent by Dr. Kirk, of Zanzibar, who had found it on a species of *Mimosa*. He considered it to be allied to *Psyche* and *Oiketicus*; and it was remarkable on account of its form, which bore a striking resemblance to that of a flattened *Helix*. It appeared to be constructed of a substance resembling *papier maché*, with a smooth, whitish, external coating.—Mr. C. O. Waterhouse exhibited some remarkable varieties of British Lepidoptera, viz., *Chrysophanus phlæas*, *Polyommatus Adonis*, *P. Alexis*, and *Agrotis exclamationis*.—Dr. Buchanan White forwarded an extract from the *Medical Examiner* of December 21 last, containing an account by Dr. Tilbury Fox of an extraordinary case of "Pruritus," which afflicted every member of a family and household, including even the dog and cat. A specimen of the insect causing it had been submitted to Dr. Cobbold, who had pronounced it to be a species of *Trombidium*, which was believed by Dr. Fox to have originated from certain plants in the garden, and that the cat and dog which appeared to have been the first affected, were agents in conveying the parasites to the human members.—The following papers were read, viz.:—Notes on the African *Saturnidæ* in the collection of the Royal Dublin Society, by W. F. Kirby.—Descriptions of new genera and species of Phytophagous beetles belonging to the family *Cryptocephalidæ*, together with diagnoses and remarks on previously-described genera, by Joseph S. Baly.—Descriptions of new species of Phytophagous beetles belonging to the family *Eumolpidæ*, including a monograph of the genus *Eumolpus*, by Joseph S. Baly.

Physical Society, February 17.—Prof. W. G. Adams, vice-president, in the chair.—Mr. T. W. Philips, C.E., was elected a member of the society.—Prof. Guthrie exhibited, for Mr. C. J. Woodward, an apparatus he has devised for showing to an audience the interference of transverse waves. A light frame, capable of moving in a vertical plane, carries a horizontal strip of tin about two feet in length, cut in the form of the ordinary sine wave, and which supports, by means of a roller, a light wooden block carrying an ink recorder in front of a sheet of paper. This block slides in a vertical slot in a piece of wood, which can be moved horizontally, supported by a roller on another similar strip of tin fixed parallel to the first, and vertically below it. The movable frame rests on a castor attached to this block. If the relative positions of the waves be now varied, and the blocks moved along them, the path traced by the ink recorder will represent the wave due to their combination.—Mr. S. P. Thompson exhibited some galvanometers in the form of magic-lantern slides which he has arranged for exhibiting their indications to an audience. The instruments are, however, only capable of indicating comparatively powerful currents, and he hopes to succeed in arranging forms of greater sensitiveness. The index-needle is usually formed of cardboard, and two small steel needles are attached to it parallel to its axis. It is pivoted lightly between glass plates, and influenced by the current traversing coils of wire placed beyond the circle in which it rotates. The best effects were obtained by means of two curved electro-magnets surrounding a small steel magnet, but this form is inapplicable to quantitative determinations, on account of the residual magnetism of the iron cores. A gold leaf electroscope formed on this principle was capable of detecting very small charges of statical electricity.—Mr. Wilson then showed an arrangement for exhibiting convection-currents in heated water. It consists of a small glass cell with parallel sides. In the base of the wood dividing the sides is cut a slight depression, to expose a brass tube which traverses it horizontally, and is open at one end, while the other is bent at right angles and connected with a flask containing water. The brass tube, where it is exposed in the cell, is surrounded with a jelly formed of gelatine containing rose aniline,

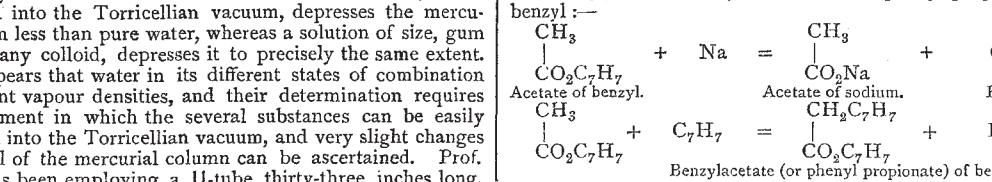
and the cell is filled with water and projected on the screen. When the tube is heated by boiling the water in the flask, the jelly is liquefied, and the liberated colouring-matter rises in the water, showing the direction of the heated current.—Prof. Guthrie exhibited an arrangement he has been using, with a view to determine the vapour-tension of water, and explained the difficulties to which such a determination is liable, and the manner in which his apparatus has so far failed. It was shown that a crystal of alum or a saturated solution of salt, when introduced into the Torricellian vacuum, depresses the mercurial column less than pure water, whereas a solution of size, gum arabic, or any colloid, depresses it to precisely the same extent. It thus appears that water in its different states of combination has different vapour densities, and their determination requires an arrangement in which the several substances can be easily introduced into the Torricellian vacuum, and very slight changes of the level of the mercurial column can be ascertained. Prof. Guthrie has been employing a U-tube thirty-three inches long, one extremity of which is bent, and terminates in a capillary opening, and a bulb is formed at the U-bend. If the substance under examination be introduced at the open end after the apparatus has been filled with mercury, inverted and the superfluous metal escaped, the mercury expelled through the capillary opening will give a measure of the amount of the depression.—Prof. McLeod suggested a modification of this form of apparatus.—Prof. Guthrie then showed the manner in which electricity is distributed on non-conductors, such as the plate of an electrophorus, by placing it for a given time beneath a point connected with a charged Leyden jar, and subsequently sprinkling a mixture of sulphur and litharge over it. It was shown that the diameter of the circle formed below the point after the superfluous powder had been removed is not purely a function of the distance between the point and the plate, but is mainly influenced by the conductivity of the material, and further, that if the point be directed obliquely towards the plate, the circle formed is very slightly eliptical, but the elipticity is in no degree proportionate to the obliquity of the point; and finally, he showed that if the non-conducting plate of an electrophorus be written upon with a metal and sprinkled with the above mixture of sulphur and litharge, the former or latter adheres according to the nature of the metal used, and he suggested that some such arrangement might be employed as a kind of electrical touch-stone for discriminating between certain metals.

EDINBURGH

Royal Physical Society, February 21.—R. H. Traquair, M.D., president, in the chair.—A paper was read by Dr. Traquair, on the structure of the lower jaw in *Rhizodopsis* and *Rhizodus*. He stated that he had ascertained that the detached bone hitherto considered to be the premaxilla of *Rhizodopsis* was in reality the dentary element of the lower jaw. This bone shows one large laniary tooth at its anterior extremity, behind which the margin is set with a series of small teeth of uniform size. Complete specimens of the mandible of *Rhizodopsis* show, however, besides the large tooth in front, several others placed at intervals behind it, and internal to the range of small teeth. The question was, therefore, what had become of these other laniaries in cases where the dentary bone was found detached. An explanation of this was afforded by an investigation into the structure of the lower jaw in the closely-allied *Rhizodus*. In this gigantic form the dentary element of the mandible is conformed just as in *Rhizodopsis*, bearing one large tooth in front, the rest of the margin being occupied only by smaller ones, the remaining laniary teeth being borne by separate internal dentary pieces articulated to the inner side of the dentary proper, and of course liable to be dispersed and lost in cases where the elements of the lower jaw had become detached from each other before their entombment as fossils. Analogous accessory bones bearing the large teeth of the lower jaw had previously been known to exist in the dendrodont fishes of the Old Red Sandstone. As regards the true premaxilla of *Rhizodopsis*, it was ascertained by Dr. Traquair to be a very small bone articulated to the front of the cranial shield as in other fossil fishes of the same group. Papers were read (1) on the ornithology of Yedo, by Colin A. McVean, and (2) on the occurrence of the Black Redstart (*Ruticilla tithys*) in Stirlingshire, by J. A. Harvie Brown.

BERLIN

German Chemical Society, February 12.—A. W. Hofmann, vice-president, in the chair.—A. Wüllner states that an observation lately published by F. Müller, that steam raises the temperature of saline solutions above 100°, was known before the time of Gay-Lussac, and is in no way opposed to the fact that the steam evolved from saline solutions has the temperature of the latter, as observed by the late G. Magnus and himself.—C. Hensgen continuing his researches on the action of hydrochloric acid on sulphates, has observed the transformation of blue vitriol and of sulphate of magnesia into chlorides at a red heat.—M. Conrad and W. R. Hodgkinson have found that the action of sodium on acetate of benzyle engenders benzyl-acetate of benzyl, that is hydrocinnamate (phenyl-propionate) of benzyl:—



Benzylacetate (or phenyl propionate) of benzyl.

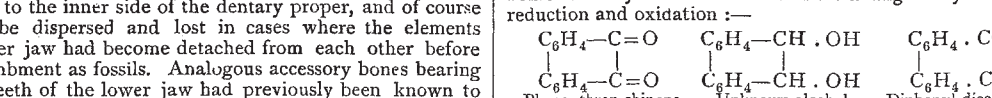
E. Chambon states that bromine transforms fuchsine into tetrabrominated rosaniline-bromhydrate $C_{10}H_{15}Br_4N_3.HBr$, a fact already known through the researches of Caro and Gräbe.—T. Iobst and O. Hesse describe several constituents of coto bark: *paracotoin* $C_{19}H_{12}O_6$, transformed by barytes into paracotoinic acid $C_{19}H_{14}O_7$, and by potash into paracumarhydrine:—

$$C_{19}H_{12}O_6 + 2H_2O = CO_2 + 2C_9H_8O_3$$

Para-cumarhydrine.

This losing water easily yields $C_9H_6O_2$ paracumarin. They also describe hydrocotoin $C_{22}H_{20}O_6$, Cotoin $C_{22}H_{18}O_6$, cotonetin $C_{20}H_{16}O_5$, oxyleucotin $C_{21}H_{20}O_7$, leucotin $C_{21}H_{20}O_6$.—H. Beckurts and R. Otto prefer sulphuric acid to alkali for transforming propionitril into propionic acid. They consider solid dichloropropionitril to be polymeric with the liquid substance. They likewise describe dichloropropionic acid and its transformation into monochloracrylic and pyroracemic acid.—C. A. Martius gives a detailed description of the production and refining of petroleum in Pennsylvania.

February 26.—A. W. Hofmann, vice-president, in the chair.—A. Christomanos published the result of a great number of analyses of Greek chrome-iron-ore leading up to the formula of R_3O_4 with varying amounts of CaO, MgO, SiO, &c. The proportion of Cr_2O_3 and FeO varies between 1:2, 2:3, 1:1, and 3:2.—From researches by K. Heumann, it appears that the greenish powder resulting from the action of nitrate of silver on ultramarine (discovered by Unger) is a mixture. The chief ingredient is yellow, but it has not been analysed.—J. H. Droeze has determined the solubility of sulphate of lime in water at various temperatures and in solutions of various salts.—T. Moddermann published speculations on atomicity.—V. Meyer denied the correctness of Ladenburg's experiments and his conclusions as to the difference of $N(C_2H_5)_3$ C_7H_7I and $N.(C_2H_5)_2 . C_7H_7 . C_2H_5I$.—Br. Radziszewsky communicated that the following bodies show phosphorescence under the oxidising influence of alcoholic potash: paraldehyde, metaldehyde, aldehyde-ammonia: furfurin, hydrocinnamide, hydrocuminamide, hydranisamide, anisidin; formic aldehyde. The author calls attention to the observation of Duchenim, that noctiluca miliaris acts on the skin like nettles, which have been proved to contain formic acid. He thinks that noctilucæ may contain formic aldehyde.—R. Auschütz has found that chloride of acetyl transforms bibasic acids, viz., succinic, phthalic, and diphenyl-dicarbonic acids into anhydrides, being itself transformed into acetic acid. The same chemist, conjointly with R. Schultz, has tranformed phenanthrenchinone into diphenyl-dicarbonic acid by the action of sodium amalgam by simultaneous reduction and oxidation:—



E. Hartwig published preliminary remarks on phthalic aldehyde.—H. Limpricht has found that hydrochloric acid transforms sulphonic acids into the corresponding hydrocarbons:—

$$C_6H_5SO_3H + HCl = C_6H_6(+ SO_3Cl?).$$

O. N. Witt, in a note on the history of chrysoidine, claims for himself the discovery of this colouring-matter, while he acknowledges that H. Caro has likewise prepared this substance by an independent discovery.—A. Baeyer has prepared from furfurol, $C_4H_3O . COH$, and acetic anhydride, a new acid:—

$$C_4H_3O . CH = CH . COOH,$$

a furfuryl-acrylic acid, yielding a green colouring-matter with phenol. With propionic anhydride a homologue is obtained.—

H. Schwartz has studied the bromides and chlorides of chlorinated anthracene and their action on potash.—Arno Behr, chemist to the large sugar-refinery of Messrs. Matthiessen and Wichers in Jersey city, has found in the residues of cane-sugar aconitic acid, while citric acid is one of the regular ingredients of beet-root.—A. W. Hofmann after showing a circular table of chemical reactions designed by Dennis Monnier in Geneva, returned to the statement of Kern that mono-methyl-aniline, formerly described by the speaker, does not exist, and read a paper by F. Hepp, who described mono-methyl-aniline obtained from sodium-aceto-methyl-aniline, with the same properties formerly described by himself. Hofmann has obtained the same body by the action of chloride of ethyl on anilline.

GENEVA

Physical and Natural History Society, December 7, 1876.—M. Théod. Turrettini presented a specimen of a diplographe, or writing machine for the blind, constructed at his workshop. The apparatus is the invention of M. Ernest Recordon, and prints at once for the blind according to one of the systems in use for them, and for the seeing in ordinary characters.—M. Th. Turrettini explained the method devised by M. Raoul Pictet and himself, to obviate the opacity of the ice obtained by the machine of M. Pictet. The opacity of the ice thus manufactured results from the rapidity of the freezing of the water, which does not permit the air contained in the liquid to escape during its change of state. By retarding considerably this freezing the ice obtained is transparent. We may thus obtain an almost complete transparency by expelling from the freezing water the air which it contains by the preliminary action on the water of a paddle-wheel agitating the liquid.—Mr. Duby presented a paper relating to eighteen species and one genus of new mosses from Japan, the Philippines, and Mauritius. A considerable number of mosses from Mauritius are also met with in the Sunda Islands.—M. Hermann Fol gave an account of observations made by him on the fecundation of eggs, especially of the sea-urchins. He has seen the zoosperm penetrate the vitellus and push a species of vesicule into the interior of the wall of the egg. Starred grooves show themselves soon after all over the vesicule. The latter then detaching itself from the wall begins to move, approaches a female nucleus, and combines with it so as to form only a single nucleus. At the two poles of this nucleus are formed two small masses of protoplasm, from which devolve starred grooves both in the interior and exterior of the nucleus. These polar masses enlarge, deviate more and more, then the cellular division takes place. In other animals the phenomenon is complicated, but may also be followed.

December 21, 1876.—Prof. Schiff gave a *résumé* of his researches on the electricity of the nerves for the purpose of examining the electric nature of the nervous agent, and determining whether the currents are produced in the nerves of living animals. He concludes that the normal nerve when the animal is in a state of immobility does not present any current. When a current manifests itself it results from the alteration of the death of the nerve such as is produced by section, or better still from nervous activity, and the contraction which accompanies it.

VIENNA

Imperial Academy of Sciences, December 7, 1876.—The following, among other papers, were read:—Contributions to a knowledge of the Bryozoa of the Bohemian Chalk formation; second part treating of the Cyclostomata, by M. Novak.—Studies on the geological origin and the progressive development of the North Albanian coast land, by M. Koncicky.—New observations on Geissler tubes, by M. Rosicky.—On the earthquake of Belluno on June 29, 1873, by M. Höfer.

December 14, 1876.—On the formation and integration of equations, which determine the molecular motion in gases, by M. Boltzmann.—On the nature of gas molecules, by the same.—On a remarkable property of periodic series, by M. Toepler.—On the methylic ether of resorcin, and on glycyrohizin, by M. Habemann.—On grape sugar, by MM. König and Rösenfel.

January 4, 1877.—On the origin of the posterior nerve-roots in the spinal cord of Ammocoetes (*Petromyzon planeri*), by M. Freud.—New methods for solution of indeterminate quadratic equations in whole numbers, by M. Kunerth.—On the amyloid substance in heart flesh, by M. Heschl.—On aperture widening muscles, by M. Exner. Longitudinal muscle-fibres in the wall of an animal tube; generally widen the tube when they contract.—Observations in November at the Meteorological Observatory, Vienna.

January 11.—On *Eunicicola Clausii*, a new parasite of annelides, by M. Kurz.—On the influence of methodical drinking of hot water on the course of *Diabetes mellitus*, by M. Sommer.—Remarks on some problems of the mechanical theory of heat, by M. Baltzmann.—On a general mode of determination of the foci of contours of surfaces of the second degree, by M. Pelz.—On the vessels of bones of the skull and the dura mater, by M. Langer.—Barometric observations in the western part of the Balkans and neighbouring regions, by M. Toula.

January 18.—On drainage and irrigation works in the valley of the Save, by the General Commando in Agram.—Astronomical and geodetic determinations of the Austro-Hungarian Polar Expedition, by M. Weyprecht.—On the theory of the Bessel functions, by M. Gegenbauer.—On the theory of the action of cylindrical spirals with variable number of windings, by M. Wallentin.—On a peculiar formation of isocyanphenyl, by MM. Cech and Schwebel.—On the arrangement, use, and accuracy of M. Roskiewicz's distance-measurer, by M. Schell.—On the development-history, and the structure of the seed-envelope in Phaseolus, by M. Haberlandt.

I. R. Geological Institute, December 5, 1876.—The following papers were read:—M. Karl v. Hauer on the analysis of the acid spring lately discovered at Ranigsdorff, near Mährisch-Trübau in Moravia. The water contains a very small quantity of fixed ingredients, but the abundance of free carbonic acid is equal to the well-known Giesshübel springs. 10,000 parts of water contain in weight 26 parts of free carbonic acid, so that the volume of the latter exceeds by far that of the former. The springs may therefore be considered of remarkable quality.—M. J. Gamper on diluvial vertebrates. At a little distance from the Klause at the Gahus Mountain near Gloggnitz, the author found a block of limestone covered by thin strata containing remains of vertebrate bones; in some places the layer formed a real breccia of bones. Among the remains he noted especially those of bats. The blocks formed a part of the inner wall of a cleft or cavern, like those often found in limestone mountains of this country. M. Gamper then referred to the occurrence of clay silicate near Steinbrück, and of arseno-pyrite in Joachimsthal.—M. Itache continued his communications on the eruptive rocks that he examined last summer in the mountainous regions of Upper Vintschgau, Ortler, and Veltlin, mentioning particularly the various species of tonalites from Morignone, the Gabbor rocks from Frontale and Leprese, and some little-known rocks containing many garnets. In the country of Soudalo and Boladore, light coloured pegmatites intersect in veins the dark coloured amphibolite and diorite rocks.—Dr. Tietze on the Elburs Mountains in Persia. He mentioned the relatively rare occurrence of old crystalline rocks in this mountain chain. The formations which may be determined by palæontological evidence are the Devonian, the Carboniferous Limestone, the Lias, the Upper Cretaceous, showing various facies partly abounding in fossils, the Nummulite formation, and the younger Tertiary. Other formations, containing no fossils, could only be judged by their position relative to those formations whose geological age was clearly to be determined. Almost certain is the occurrence of Trias and Upper Jura. The Lower and Middle Cretaceous are totally wanting. Only a few of the named formations extend over the whole country, therefore if two sections are made at some distance from each other, they give almost invariably a different result. M. Tietze gave also a short account of the older and younger eruptive rocks, of which these mountains are partly composed. The volcanic Demavend is not only the highest but also the youngest mountain of the whole chain, whose dimensions are given by the author as 90-100 miles in length, and at least fifteen miles in breadth.

January 23.—Dr. E. Tietze on the geological relations of the Demavend Mountain in Persia, whose height amounts to 20,000 feet. He distinguished an upper and a lower region, the former consisting of the cone heaped up by eruptions. The highest top of the cone, acting still as a solfatara, stands within the remains of an older crater-wall. The lower part is composed to a height of 9,000 feet of sedimentary rocks (Jurassic limestones, Carboniferous sandstones, and old limestone). It must be noted particularly that the position of these sedimentary strata shows exactly the same relations as those of rocks in other parts of the Elburs Mountains which are not in contact with volcanoes, a proof therefore that the outburst of the Demavend volcano exerted no influence upon the older rocks in its vicinity. The reporter mentioned the occurrence of streams consisting of lava-boulders on the Demavend, as they are found at present on the volcanoes of Java; then of columnar trachytes and of the lava streams keeping their original position, but

steeply inclined on the slopes of this volcano. He concludes by remarking that the Demavend shows probably a double axis, such as was stated for instance on the Aetna by Sartorius and Ch. Lyell.—M. C. Paul reports on his investigations in the Karpathian Mountains made in this year. In Silesia he studied the so-called hieroglyphs of the Upper Teschen slates, whose genesis is doubtful, but which are remarkable for their constantly keeping to a strictly limited level. He also gave a more exact division of Hohenegger's Iodula sandstone and fixed the position of the Irodek sandstone which Hohenegger had adjoined to the Lower Eocene (Nummulite group) as the highest division of the Eocene. In Western Galicia the gradual change of the petrographic facies of the Lower Karpathian sandstone (Neocomien) was studied. This formation consists in the northern zone of dislocation, chiefly of sandy and clayey strata, in the southern, which is called the penninic cliff-zone it shows a more limy composition. In Przemysl he visited the locality rendered important by Niedwieczky's discovery of ammonites. It was evident that the Neocomian ammonites were contained in a zone of those rocks called usually Ropiauka beds, which had been from other reasons already denoted as Neocomien. In Eastern Galicia the Karpathian sandstones could be divided into their proper groups and marked on the map, conformable to the results obtained by the reporter in the adjacent Bucovina. The sediments of the Karpathian sandstone divide here into the lower period (Ropiauca beds, Neocomian), the middle period (for the most part massy sandstones, probably middle Cretaceous), and the upper period, most certainly Eocene (to which belong sandstones containing Nummulites, the well-known fish-slates of Delatze, the Smilus slates, Schipoter beds, and the Magura sandstones of Czeruahora).

PARIS

Academy of Sciences, February 26.—M. Peligot in the chair.—M. Le Verrier reminded the Academy of the importance of watching on March 21, 22, and 23 for the possible transit of an intra-Mercurial planet across the sun. He also presented tome xiii. of *Annales de l'Observatoire de Paris*. This contains the theory of Uranus and Neptune, and M. Cornu's memoir on determination of the velocity of light between the Observatory and Montlhéry (by Fizeau's method improved). He finds this velocity 300,400 kilometres per second of mean time; the deduced solar parallax is 8″·88, 8″·88, or 8″·80, according as the number is combined with the equation of light given by Delambre (493″·2), with Bradley's constant of aberration (20″·25), or with that of Struve (20″·445).—M. Debray was elected member for the section of chemistry in place of the late M. Balard (the other candidates being M. Clöez and M. Friedel).—Experiments on the origin and the nature of typhoid fever, by M. Guérin. He had in view the supposed direct influence of water-closets in producing the fever, and experimented on rabbits, injecting fecal matter, urine, blood, &c., from typhoid patients. He concludes (1) that such fecal matter contains, after issuing from the system, a toxical principle capable of causing death in a class of animals, in time varying from a few hours to a few days; (2) that the same holds for urine, blood, mesenteric liquid, and the detritus of mesenteric ganglions and of ulcerated intestinal mucus of typhoid subjects; (3) that these matters, after some months, are found to retain in large measure their original toxical principles; (4) that the fecal matters of healthy subjects or of those affected by other diseases have not the toxical principles which appear in excrementitial products of typhoid subjects.—On the effects of a jet of air in water, and on the suspension of water in air, by M. De Romilly. Among other experiments: Into a bell-jar, the mouth of which is closed with net, water is sucked up by means of a tube, with stopcock, entering the jar above. On closing the cock and raising the jar the liquid is retained, there being a meniscus at each mesh and a general meniscus. On inclining the jar the water flows out, but the smaller the mesh you may incline further without escape of liquid. Using metallic net, one may place a lighted gas jet under the suspended liquid, which will boil (gently) without falling down. (In this case the jar should be connected with another larger, the mouth of which rests in water.)—On the functions of leaves in the phenomena of gaseous exchanges between plants and the atmosphere; *rôle* of stomates, by M. Merget. He shows that the leaf functions of absorption and exhalation are arrested when a layer of varnish is formed on the face bearing the stomates. Thus the leaf may be subjected to mercurial emanations without absorbing a trace of the metal, which can, of course, be easily detected by photographic processes. On the other hand, if an ammoniacal liquid be injected into the leaf, the liberation of the dissolved gas by the face that has stomates is proved by the odour of this face, it white appearance when a rod dipped in hydrochloric acid is brought near, and its printing of paper sensitised with nitrate of mercury.—On ophthalmia, by M. Brame. He specifies twelve different categories and treatment.—New experiments to try for combating the phylloxera of the roots, by M. Rommier. He proposes salts or oxides of mercury, lead, copper, zinc, and others, dissolved in alkaline hyposulphites (potash or lime). Such compounds would not be acted on by the acids of the soil, like previous insecticides.—Determination of the lines of curvature of a class of surfaces, and particularly of the tetrahedral surfaces of Lamé, by M. Darboux.—Integrals of curves of which the developers by the plane and the developed by the plane are equal to each other, by M. Aoust.—Fourth note on the theory of the radiometer, by Mr. Crookes.—On the action of water on chlorides of iodine, by M. Schützenberger. If chlorides of iodine are not decomposed into hydrochloric acid, iodic acid, and free iodine, it is because the direction of the reaction is modified by the existence of a compound of hydrochloric acid and of protochloride of iodine stable in presence of water.—Formation of quinones by means of chlorochromic acid, by M. Etard.—On a saccharine matter extracted from leaves of walnut, by MM. Tanret and Villiers. The composition of the body is the same as that of *inosite*, but it has some special properties, and the authors name it (provisionally) *nucite*.—On the salts of the Algerian Chotts, by M. le Chatelier. They contain chloride of sodium and sulphate of soda; probably also carbonate of soda mixed with gypsum.—On three recent falls of meteoric stones in Indiana, Missouri, and Kentucky, by Mr. L. Smith.—Experiments on acute poisoning with sulphate of copper, by MM. Feltz and Ritter. These were made on frogs, pigeons, rabbits, and dogs. Sulphate of copper cannot be regarded as a harmless agent, though its introduction into the system does not, in the great majority of cases, cause death. No one would consent to swallow, in food or drink, the quantity that would prove fatal.—On the congestive and hæmorrhagic alterations of the brain and its meninges in birds, by M. Larcher.

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